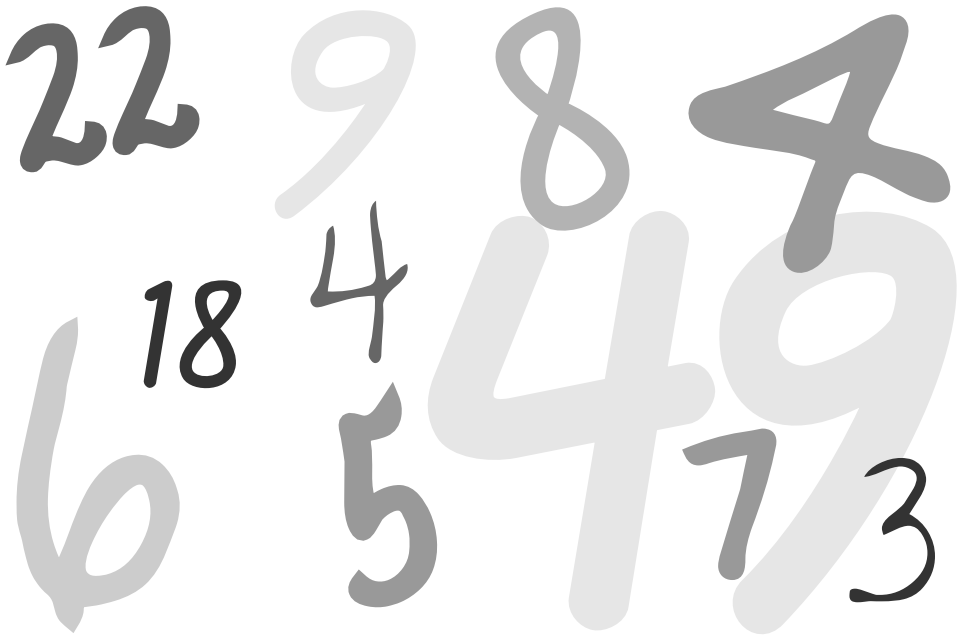
Michigan Educational Assessment Program
MEAP



Grade 4
Mathematics Assessment Model

April 2001

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TABLE OF CONTENTS

INTRODUCTION

This document, the Mathematics Assessment Model, is designed to communicate the substance and format of the new MEAP mathematics assessment for 2001–2. Audiences for this assessment model include students, parents, teachers, curriculum specialists, and administrators. The model represents a collaborative effort under the joint leadership of the Michigan Department of Treasury's Michigan Educational Assessment Program and the Michigan Department of Education's Curriculum Development Program Unit. Major review and input was further provided by content advisory committee members who played a substantial role in the development of the new mathematics tests.

PURPOSE OF THIS DOCUMENT

The primary purpose of this document is to acquaint all teachers of mathematics with the design of the assessment. The mathematics assessment was developed from, and is aligned with, *the Mathematics Standards of the Michigan Curriculum Framework*. A review of the released test form in this document will give teachers concrete examples of assessment items. Because these items are released, they will not appear in operational forms of the assessments. Each of the items included in the Assessment Model was drawn from items that were tested with a representative sample of Michigan students at grade 4 during the Fall 2000 item tryout. All portions of this document may be copied and distributed for educational use.

ORGANIZATION

The Mathematics Assessment Model contains four parts.

Part one includes introductory material that details the number, type, context, and point value of the assessment items. This first part represents the basic framework on which the assessment was built.

Part two of the Assessment Model contains a released form of the assessment. This model is a complete test form which represents what students will be given at the time of testing.

Part three contains a sample of student responses, scoring guides, and annotations on scoring.

Part four contains a glossary, a brief list of resources, and the names of individuals who were instrumental in the development of this mathematics assessment in Michigan.

PART ONE: FRAMEWORK OF THE ASSESSMENT

VISION FOR MATHEMATICS

A mathematically powerful individual should be able to:

- *reason mathematically;*
- *communicate mathematically;*
- *problem solve using mathematics; and*
- *make connections within mathematics and between mathematics and other fields.*

Mathematics is the science of patterns and relationships. It is the language and logic of our technological world. Mathematical power is the ability to explore, to conjecture, to reason logically and to use a variety of mathematical methods effectively to solve problems. The ultimate goal of mathematics education is for all students to develop mathematical power to participate fully as citizens and workers in our contemporary world.

The 15 standards listed in the *Mathematics Content Standards of the Michigan Curriculum Framework* establish expectations for what students should know and be able to do as a result of their mathematics education.

The Mathematics Content Standards are grouped into six categories called strands, which are further divided into content standards. These standards, expressed as attributes we envision for our graduates, are the intended results of students' experiences with a core curriculum. Students are expected to make continuous progress toward meeting the standards at each level of schooling. All standards should be pursued at every grade level of a school's core curriculum from kindergarten through graduation. Benchmarks are established for each standard to designate what students are expected to learn within grades K-4, 5-8, and 9-12 to indicate progress toward meeting these standards. The assessment is designed from a subset of these benchmarks determined to be "testable" on a statewide assessment.

COMPREHENSIVE ASSESSMENT

A comprehensive assessment system consists of a statewide, district, and classroom assessment, and performance standards that form a link to content standards and teaching and learning standards. No single assessment instrument can provide all the information needed to accomplish the ultimate purpose of assessment which is to improve teaching and learning. An integrated approach that is necessary and includes both mathematics content standards and benchmarks, assessed with the most appropriate methods available.

PURPOSE OF STATEWIDE ASSESSMENT

The statewide mathematics assessment is designed to provide information about student achievement in mathematics, promote assessment practices that support learning for all students, and foster curriculum and instruction that is aligned with the state *Mathematics Content Standards*. This assessment may be used by students, parents, teachers, school districts, researchers, and state government to advance the quality of mathematics education.

STANDARDS ASSESSED AT THE STATE LEVEL

Statewide assessment is based on the *Content Standards for Mathematics of the Michigan Curriculum Framework*. Figure 1 presents the 15 content standards to be assessed.

Patterns, Relationships and Functions	Geometry and Measurement	Data Analysis and Statistics	Number Sense and Numeration	Numerical and Algebraic Operations and Analytical Thinking	Probability and Discrete Mathematics
I.1 *Patterns*	II.1 *Shape and Shape Relationships*	III.1 *Collection, Organization and Presentation Of Data*	IV.1 *Concepts and Properties Of Numbers*	V.1 *Operations and Their Properties*	VI.1 *Probability*
I.2 *Variability and Change*	II.2 *Position*	III.2 *Description and Interpretation*	IV.2 *Representation and Uses Of Numbers*	V.2 *Algebraic and Analytical Thinking*	*VI.2 Discrete Mathematics*
	II.3 *Measurement*	III.3 *Inference and Prediction*	IV.3 *Number Relationships*		

Figure 1: Mathematical Standards to be Assessed

STANDARDS FOR THE ASSESSMENT DESIGN

Seven standards* were applied as criterion to guide the development of items for this assessment:

Organization of Information – The task asks students to organize, synthesize, interpret, explain, or evaluate complex information in addressing a concept, problem, or issue.

Consideration of Alternatives – The task asks students to consider alternative solutions, strategies, perspectives, or points of view in addressing a concept, problem, or issue.

Disciplinary Content – The task asks students to show understanding and/or use ideas, theories, or perspectives considered central to an academic or professional discipline.

Disciplinary Process – The task asks students to use methods of inquiry, research, or communication characteristics of an academic or professional discipline.

Communication – The task asks students to communicate their understandings, explanations or conclusions.

Problem Connected to the World Beyond the Classroom – The task asks students to address a concept, problem or issue similar to one they have encountered or are likely to encounter in life beyond the classroom.

Audience Beyond the School – The task asks students to communicate their knowledge, present a product or performance, or take some action for an audience beyond the teacher, classroom, and school building.

*These seven standards were adopted from the Center on Organization and Restructuring of Schools at the University of Wisconsin.

ITEM TYPES

The assessment features two types of items. Both require students to apply what they have learned and to analyze information presented by a prompt. The two types of items are:

Selected response:	Students select a response from four possible choices. These items can involve multiple steps and computations but generally require a short amount of time to complete.
Constructed response:	Students supply a solution to a problem to be evaluated in terms of both the final response and the approach used to reach that response. Multiple approaches to solving these problems are accepted and partial credit is granted for incomplete work. Effectively demonstrating one's work is critical. This work can be expressed in various forms, e.g., a narrative, calculations, charts, or graphs.

DISTRIBUTION OF ITEMS BY STRAND AND TYPE OF FORMAT

Figure 2 shows the distribution of test items by strand and item type. Selected-response items are worth 1 point and constructed-response items are worth 4 points. On the grade 4 test, 28 of the 44 points possible are assigned to selected-response items and 16 points assigned to constructed-response items. In other words, more than 1/3 of the total score is attributed to constructed-response items.

Emphasis by Strand and Item-Type

STRAND	**Elementary School %**
Patterns, Relationships, and Functions	15
Geometry and Measurement	25
Data Analysis and Statistics	20
Number Sense and Numeration	20
Numerical and Algebraic Operations and Analytical Thinking	15
Probability and Discrete Mathematics	5

ITEM TYPE	Items	Points	Percent Of Points
Selected–Response (1 point each)	28	28	64
Constructed–Response (4 points each)	4	16	36
Total Assessment	32	44	100

Figure 2: Distribution of Items Grade 4

CONTEXT FOR ELEMENTARY SCHOOL ITEM SELECTION

This test will address the "testable" portion of the state curriculum framework for elementary school. Furthermore, only partial coverage of the total set of testable benchmarks is provided for in any single assessment.

The assessable content is defined in "Assessable Content: Content Standards and Benchmarks for Mathematics," which can be reviewed on the Merit Website: www.meritaward.state.mi.us.

SAMPLE GRADE 4 ITEMS

To help educators anticipate the kinds of items being planned for state assessments, this document includes a complete released form of this test for grade 4.

The *Mathematics Assessment Model* reflects a commitment to constructed response items because these types of items are necessary to determine the extent to which students are meeting the *Model Content Standards for Mathematics.* Examples of scoring guides that might be used to score these items follow the released form in Part Three of this document.

ASSESSMENT REPORTS

The results of the mathematics assessments will be reported by the strands of the *Content Standards*. The following strands, or combination of strands, will be reported on the Elementary School Test :

- Patterns, Relationships, and Functions
- Geometry and Measurement
- Data Analysis and Statistics combined with Probability and Discrete Mathematics
- Number Sense and Numeration
- Numerical and Algebraic Operations and Analytical Thinking

TEACHING AND LEARNING STANDARDS

The connection between instruction and assessment is an important link in designing an assessment. The following instructional standards were considered in the design of the assessment.[1]

Standard 1: Higher Order Thinking

Instruction involves students in manipulating information and ideas by synthesizing, generalizing, explaining, hypothesizing, or arriving at conclusions that produce new meanings and understandings for them.

Higher order thinking requires students to manipulate information and ideas in ways that transform their meaning and implications. This occurs when students combine facts and ideas in order to synthesize, generalize, explain, hypothesize or arrive at some conclusion of interpretation. Manipulating information and ideas through these processes allows students to solve problems and discover new meanings (for them) and understandings.

Lower order thinking occurs when students are asked to receive or recite factual information or to employ rules and algorithms through repetitive routines. As information receivers, students are given pre-specified knowledge ranging from simple facts and information to more complex concepts. Students are not required to do much intellectual work since the purpose of instruction is simply to transmit knowledge or to practice procedural routines.

Standard 2: Deep Knowledge

Instruction addresses central ideas of a topic or discipline with enough thoroughness to explore connections and relationships and to produce relatively complex understandings.

Knowledge is deep when central ideas of a topic or discipline are explored in considerable detail that shows interconnections and relationships. Knowledge is deep when, instead of being able to recite only fragmented pieces of information, students express relatively systematic, integrated or holistic understandings of central concepts. Mastery is demonstrated by students discussing relationships, solving problems, constructing explanations, and drawing conclusions.

Depth of knowledge and understanding can be indicated by the substantive character of the ideas that the teachers present in the lesson and by the level of understanding students demonstrate as they consider these ideas.

Standard 3: Substantive Conversation

Students engage in extended conversational exchanges with the teacher and/or with their peers about subject matter in a way that builds an improved and shared understanding of ideas or topics.

In classes characterized by high levels of substantive conversation there is sustained teacher-student and/or sustained student-student interaction about a topic. The interaction is reciprocal and it promotes coherent shared understanding. Substantive conversation has three features:

1. The talk is about subject matter in the discipline and includes higher order thinking such as making distinctions, applying ideas, forming generalizations, raising questions, not just reporting of experiences, facts, definitions, or procedures.

2. The conversation involves sharing of ideas and is not completely scripted or controlled by one party (as in teacher led recitation). Sharing is best illustrated when participants explain themselves or ask questions in complete sentences, and when they respond directly to comments of previous speakers.

3. The dialogue builds coherently on participants' ideas to promote improved, collective understanding of a theme or topic.

To recognize substantive conversation, we first define an interchange as a statement by one person and a response by another. The interchanges need not be between the same two people, but they must be linked substantively as consecutive responses.

Standard 4: Connections to the World Beyond the Classroom

Students make connections between substantive knowledge and either public problems or personal experiences.

A lesson gains in authenticity the more there is a connection to the larger social context in which students live. There are at least three ways in which student activity in classrooms can reflect some connections to life beyond school. First, lessons might focus on understanding a real-world, public problem of some contemporary significance; for example, applying statistical analysis in preparing a report to the city council on the homeless. Second, lessons can build upon students' personal experiences to connect to important ideas in the disciplines; for example, by comparing approaches to conflict resolution between people and nations. Finally, if students attempt to communicate their knowledge to others beyond the classroom, to influence or to assist others, school knowledge is more likely to have value beyond simply achieving success in school.

[1] *A Guide to Authentic Instruction and Assessment: Vision, Standards and Scoring* (1995) written by Fred M. Newmann, Walter G. Secada, and Gary G. Wehlage at the Wisconsin Center for Education Research.

PART TWO: RELEASED TEST FORM

GRADE 4

MATHEMATICS ASSESSMENT MODEL

SPRING 2001

SAMPLE GRADE 4 ITEMS

To help educators anticipate the kinds of items being planned for state assessments, this document includes a complete released form of this test for grade 4. ***While this form may be administered to students as a practice test, it should not be assumed to duplicate precisely the difficulty levels of any future live forms of the test.***

Day One: Mathematics Assessment

Directions to the Student

In this test you will demonstrate your understanding of mathematics. The test has three parts. You will have at least 30 minutes to finish each part of the test. You will be given additional time if necessary.

You must record your answers to **all** questions in your TEST BOOKLET.

Use only a No. 2 pencil to mark your answers. Circle the correct letter completely. If you erase an answer, be sure to erase the first circled letter completely. You may use calculators on this test.

There are two types of questions on this test:

1. Some questions will require you to choose the best answer from among four answer choices.

2. Some questions will require you to write, explain, or show your work in the space provided in your test booklet.

Here are some important things to remember as you take this test:

1. Read each question carefully and think about the answer.

2. If answer choices are given, choose the best answer by circling the letter your in test booklet.

3. If an answer space is provided in your test booklet, show all your work and write your answer neatly and clearly in the space provided.

4. You should have plenty of time to finish every question on the test. If you do not know the answer to a question, go on to the next question. You may return to that question later.

5. If you finish early, you may check your work in that part of the test **only**. Do **not** look at questions in other parts of the test.

6. Once you have reached the word **STOP** in your test booklet, do **not** turn the page.

Once you have finished each part, close your test booklet and put down your pencil.

If you do not understand any of these directions, please raise your hand.

Sample Items

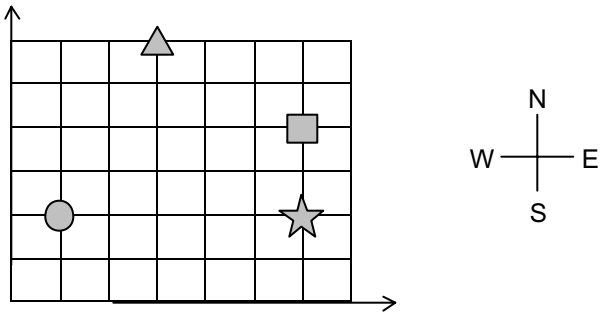
Sample Questions

To help you understand the test questions, look at the sample test questions that follow. These samples will show you what the questions in the test are like and how to mark your answers.

Multiple-Choice Sample Question

For this type of question, you will find sample 1 and circle the correct letter.

S1 Start from the ○ . First go 1 block east, then go 1 block south, then go 4 blocks east, and 1 block north. Where do you end up?



A ☆

B □

C △

D ○

For this sample question, the correct answer is **A**.

Sample Items

Open-Ended Sample Question

For this type of question, you will write, explain, or show your work in the space provided in your test booklet.

S2 The Lopez children went to the show. They wanted to buy a tub of popcorn that cost $1.35. They checked their money and had the following:

- Maria had 2 quarters.
- Carlos had $.40 in dimes.
- Luis had the same number of nickels as Carlos had dimes.
- Ana had 2 dimes and 2 nickels.

Did the Lopez children have enough money to buy the popcorn? Explain how you arrived at your answer. Show all your work.

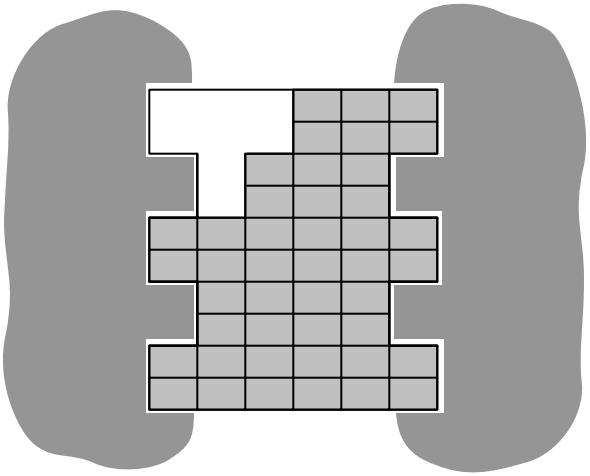
50
40
20
20
+ 10
$1.40

Yes. They had 5 more cents than they needed.

For this sample question you would answer yes, explain that they had 5 more cents than they needed. Remember to show your work.

Grade 4—Part I

1 Jeff's dad is putting a tile path through their garden. How many rectangular tiles will he need to complete the path?



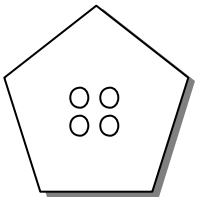
A 4
B 6
C 7
D 8

2 Carmen increased her reading time each day for one week. On Monday she read 30 minutes, on Tuesday 45 minutes, and on Wednesday 60 minutes. Based on this pattern, how much will she read on Saturday?

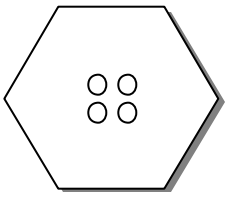
A 130 minutes
B 105 minutes
C 90 minutes
D 15 minutes

3 Everett is gathering buttons for an art project. He only wants buttons that have no parallel lines. Which of these buttons could Everett use for his project?

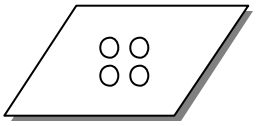
A



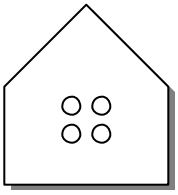
B



C



D



4 How many times should a square piece of paper be folded to get 4 equal square sections?

A 1
B 2
C 3
D 4

5 Laura is looking for a job to earn some spending money. She saw these ads posted on a bulletin board. Which job should she take to earn the most money?

Looking for child care	Wanted	Wanted	Can you deliver newspapers on Tuesdays for 3 hours?
2 hours per day, 3 days a week. Will pay $2 per hour.	Someone to walk my dog once a day, 5 days a week. Will pay $2 per day.	Someone to do yard work once a week. Will pay $10 per week.	Will pay $3 per hour.

A child care
B dog walker
C yard work
D deliver newspapers

6 Tamara put all her socks in one drawer. She has:

- 7 pairs of blue socks
- 2 pairs of white socks
- 1 pair of yellow socks

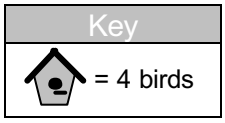
She picks one sock from the drawer without looking. What is the chance the sock will be blue?

A certain
B not possible
C least likely
D most likely

7 Miguel has a birdfeeder in his backyard. He made the picture graph below to show how many of each kind of bird he has seen. Miguel has seen 10 purple finches.

Number of Birds Seen

Black-capped Chickadees	
Cardinals	
Goldfinches	
Purple finches	



What should the picture graph show for purple finches?

A 

B 

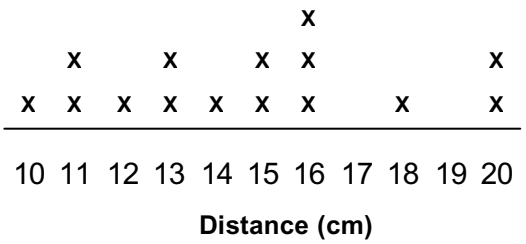
C 

D 

8 The class went on a field trip. The students left school at 9:00 a.m. They returned to school at 1:30 p.m. How long were they gone?

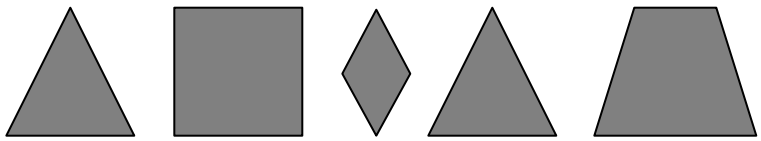
A 8 hr 30 min
B 8 hr
C 4 hr 30 min
D 4 hr

9 The science class held a frog jumping contest. What is the median distance the frog jumped?



A 11
B 15
C 16
D 20

10 During math class, Catina's teacher placed the following pattern blocks on her desk.



Which fraction shows how many of the pattern blocks are triangles?

A $\frac{2}{3}$

B $\frac{3}{5}$

C $\frac{2}{5}$

D $\frac{5}{2}$

11 Look at the calendar below.

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
1	2 ■	3	4 ■	5	6 ■ ★	7 ?
8 ■	9	10 ■	11	12 ■ ★	13	14 ■ ?
15	16 ■	17	18 ■ ★	19	20 ■	21 ?
22 ■	23	24 ■ ★	25	26 ■	27	28 ■ ?
29	30 ■ ★	31				

Tory's mom labels her calendar so Tory will know exactly what is going to happen each day.

☺ = Tory can stay outside with her friends an extra 15 minutes.
■ = Tory gets to help her mom make dinner.
★ = Surprise activity

Describe a pattern that each symbol makes on the calendar.

☺ :

■ :

★ :

Which activity does Tory get to do most often?

STOP

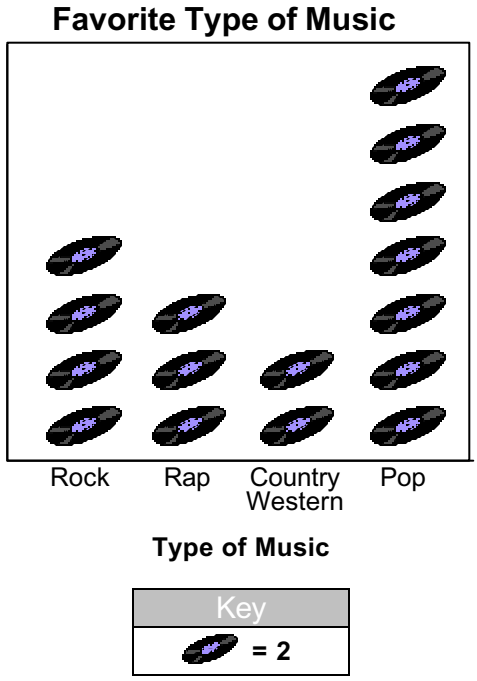
12 Pedro sold lemonade to earn money to go to the movies. He already had $7.50. Pedro needed $10.00. How many cups of lemonade must he sell if he sold each glass for $0.50?

A 3
B 5
C 15
D 20

13 Mrs. Mitchell measures her heart rate before and after jogging. To find her heart rate, she counts the number of beats in ten seconds and multiplies that number by 6. Before she went jogging, Mrs. Mitchell counted 10 beats in ten seconds. After jogging, she counted 17 beats in ten seconds. What was her heart rate before and after jogging?

A 6, 10
B 10, 17
C 10, 60
D 60, 102

14 The fourth graders collected data about the type of music they liked. The results are shown in the graph below.



Which statement correctly represents the data?

A Rock received half as many votes as Pop.
B Pop received more votes than Rap and Rock combined.
C Country Western received half as many votes as Rock.
D Rap and Country Western combined received fewer votes than Rock.

15 Rui had a surprise for Miguel. She asked him to close his eyes and placed his surprise in his hands. He felt a shape that had six square faces. Which of the following shapes was it?

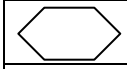
A pyramid
B sphere
C cone
D cube

16 Robert is cutting oranges for his soccer teammates. He will cut each orange into 4 pieces. Each player will get 2 pieces. There are 20 players on the team. How many oranges does Robert need to cut?

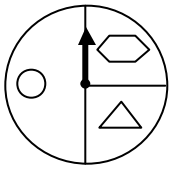
A 5
B 8
C 10
D 12

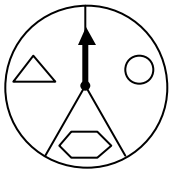
17 Steve spun the arrow on a spinner 20 times. The results are in the table.

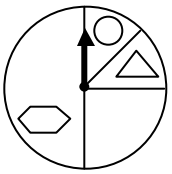
Spin Table

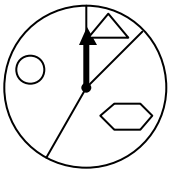
Shape	Number Of spins
	5
	5
	10
Total Spins	20

Which of these spinners would most likely give the results in the table?

A 

B 

C 

D 

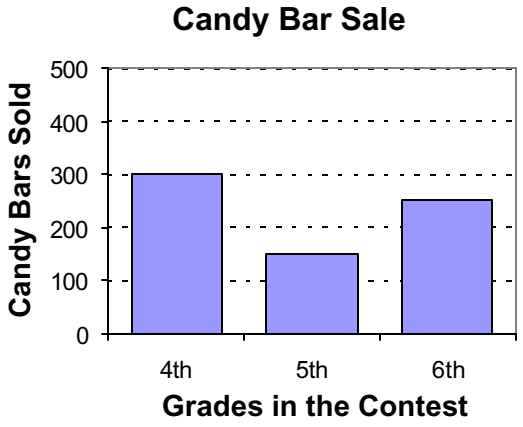
18 Justin created the following number pattern.

0, 1, 4, 13, 40, ___

What is the rule to find the next number in the pattern?

A Add 1 to the last number.
B Add 9 to the last number.
C Triple the last number and add 1.
D Double the last number and add 3.

19 The 4th, 5th, and 6th grade classes at Elmwood School wanted to earn enough money for new band instruments. They needed to sell a total of 1,000 candy bars. About how many more candy bars do they need to sell?



A 250
B 300
C 350
D 400

20 Logan reads about 19 pages an hour. He wants to read the last 50 pages of his book tonight. If he starts to read at 5:00 p.m., about what time will Logan finish?

A 7:00 p.m.
B 7:30 p.m.
C 8:30 p.m.
D 9:00 p.m.

21 Mrs. Ramirez said: " Count the letters in your name. If the sum is a multiple of 4, you can line up first." Which of these students could line up first?

Dirk	Terrence	Juanita	Michael	Kayla	Shelby	Arnie

A Dirk and Terrence
B Michael and Juanita
C Arnie and Shelby
D Kayla and Dirk

22 The following chart shows the daily attendance for the first 4 weeks of a carnival.

Day of the Week	Number of Tickets Sold					
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Sunday	255	249	208	197		
Monday	153	146	101	90		
Tuesday	169	155	117	104		
Wednesday	190	191	178	164		
Thursday	220	209	200	177		
Friday	236	233	219	187		
Saturday	303	289	264	249		

If this trend in attendance continues, during which week will the carnival be least busy?

Explain why you chose that week.

Based on the data in the chart, which day is least busy?

Explain why you chose that day.

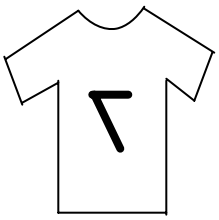
STOP

23 Michael put 10 dimes a day in a jar for 60 days. He knew the jar held 640 dimes. If he continues to put in 10 dimes every day, how many more days will it take to fill the jar?

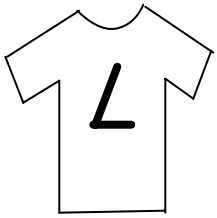
A 1
B 4
C 6
D 10

24 Phillip's baseball jersey has a number 7 on it. Which jersey shows Phillip's reflection in the mirror?

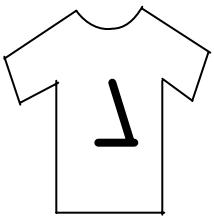
A



B



C



D

25 Four groups measured the length of their classroom wall each using a different unit of measure. The table shows their results.

Wall Measurements

Group 1	7 units
Group 2	700 units
Group 3	70 units
Group 4	7,000 units

Which group measured the wall using the smallest unit of measurement?

A Group 1
B Group 2
C Group 3
D Group 4

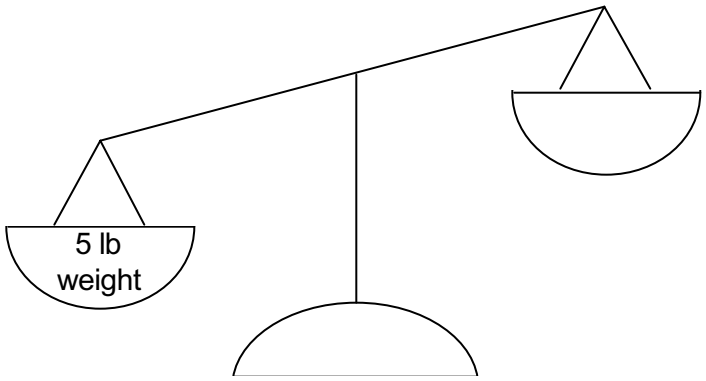
26 Bill lives on the side of the street with even-numbered addresses. Which addresses below would be found on Bill's side of the street?

A 1020, 1022, 1024
B 2021, 2023, 2025
C 3168, 3169, 3170
D 4167, 4168, 4170

27 Missy has 100 feet of rope. She cuts the rope in half. She then cuts the two pieces in half. How long is each piece of rope now?

A 10 feet
B 15 feet
C 25 feet
D 50 feet

28 Six small cans of tuna weigh 1 pound. How many cans of tuna are needed to balance this scale?

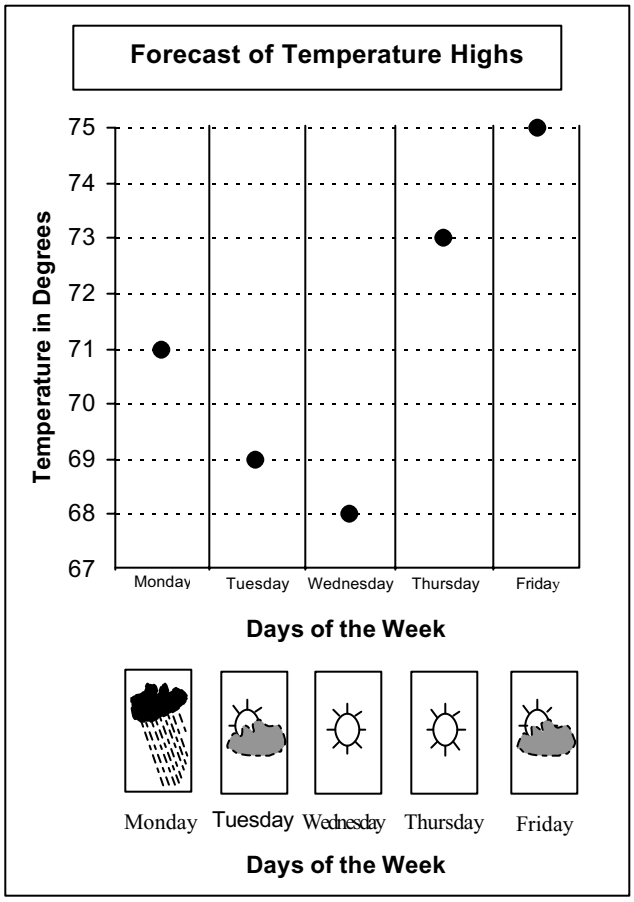


A 12
B 18
C 24
D 30

29 Joyce's brother earns $20 a month watching his neighbor's child. He also works at the neighborhood grocery store twice a month and earns $25 each time. How much money does he earn from these two jobs in a month?

A $25
B $45
C $50
D $70

30 Ramona's family is planning a picnic. Ramona's dad says the best day to go would be a very sunny day with temperatures in the 70s.



Which day would be **best** for the picnic?

A Tuesday
B Wednesday
C Thursday
D Friday

31 Some friends collect baseball cards together. They have the cards shown below in the chart.

Number of Cards	Value of Each
8	25¢ each
10	28¢ each
6	30¢ each
1	99¢ each

If they sold all of their cards, would they have enough money to buy one card worth $1.50 and one card worth $3.75?

Explain your thinking and show all your work.

32 Sarah couldn't remember the difference between a rectangle and a triangle.

Draw and label both of them in the space below.

Describe how a rectangle and triangle are similar.

Describe how a rectangle and triangle are different.

STOP

PART THREE: SCORING

This section includes sample student responses, scoring guides, and annotations on scoring for each score point on each open-ended item.

It is important to note that these sample student responses are not the only way a student can earn a particular score. They are representative of the types of responses elicited by the item. The focus is on how to relate a specific response to the scoring guide for that problem.

#11
STUDENT RESPONSES AND SCORING

A **4-point** response includes all of the following components:
- Gives a valid description of the square pattern, such as "Skip 1 day and draw a square." or "The squares are on every other day, starting with 2." or "The squares are on all the even days."
- Gives a valid description of the smiley face pattern, such as "Skip 6 days and draw a face." or "The smiley faces make a line down all the Saturdays."
- Gives a valid description of the star pattern, such as "Skip 5 days and draw a star." or "The stars make a diagonal from 6 to 30."
- Correctly identifies that Tory gets to help her mom make dinner most often.

A **3-point** response meets most of the criteria, but may do one of the following or similar:
- Gives valid descriptions for two of the symbols, but the description for one of the symbols is unclear, incorrect, or missing. Correctly identifies that Tory gets to help her mom make dinner most often.
- Gives valid descriptions for all three symbols, but the answer for the question about the most frequent activity is unclear, incorrect, or missing.

A **2-point** response meets some of the criteria, but may do one of the following or similar:
- Gives exactly two correct responses. The other two answers are incorrect or missing.
- Shows some understanding of patterns. May attempt to answer three or four parts of the problem, but two or three of the answers are unclear or only partially correct.

A **1-point** response includes one of the following or similar:
- Gives exactly one correct response. The other answers are incorrect or missing.
- Shows limited understanding of patterns. May attempt to answer two or three parts of the problem, but the answers are unclear or only partially correct.

A **0-point** response shows little or no understanding of the problem.

Student Response (4 points)

A square then a blank then a square.	**A**
Every 7 days there is a smily	**B**
Every 6 days there is a star	**C**
Help her mom make dinner	**D**

Score 4

This is a 4-point response because the student (**A)** gives a description of the square pattern, (**B**) gives a description of the smiley face pattern, (**C)** gives a description of the star pattern and, (**D**) correctly identifies that Tory gets to help her mom make dinner the most often.

Student Response (3 points)

It goes every two days.	**A**
It goes every seven days.	**B**
It goes every six days.	**C**
	D

Score 3

This is a 3-point response because the student (**A)** gives a description of the square pattern, (**B**) gives a description of the smiley face pattern, (**C)** gives a description of the star pattern and, (**D**) did not identify what activity Tory gets to do most often.

Student Response (2 points)

Squares always skip a day.	**A**
Smiley faces always skip seven days.	**B**
Stars always skip six days.	**C**
She helped mom make dinner.	**D**

Score 2

This is a 2-point response because the student (**A)** gives a description of the square pattern, (**B**) doesn't give an accurate description of the smiley face pattern, (**C)** doesn't give an accurate description of the star pattern and, (**D**) correctly identifies that Tory gets to help her mom make dinner the most often.

Student Response (1 point)

Tory gets to help her mom make supper the most.	**A** **B** **C** **D**

Score 1

This is a 1-point response because the student (**A)** doesn't give a description of the square pattern, (**B**) doesn't give a description of the smiley face pattern, (**C)** doesn't give a description of the star pattern and, (**D**) correctly identifies that Tory gets to help her mom make dinner the most often.

Student Response (0 points)

Tory gets to help her mother make dinner.	**A**
Tory can play with her friends outside.	**B**
Tory can do an activity.	**C**
	D

Score 0

This is a 0-point response because the student shows little or no understanding of the problem. The student (**A)** describes what a square stands for, but doesn't give a valid description of the pattern, (**B**) describes what a smiley face stands for, but doesn't give a description of the pattern, (**C)** describes what a star stands for, but doesn't give a description of the pattern and, (**D**) did not identify what activity Tory gets to do most often.

#22
STUDENT RESPONSES AND SCORING

A **4-point** response includes all of the following components:
- Correctly identifies Week 6 as the least busy week.
- Correctly identifies Monday as the least busy day.
- Provides clear, complete explanations supporting both answers. The explanations should show evidence of using the patterns in the table.

A **3-point** response meets most of the criteria, but may do one of the following or similar:
- Correctly identifies Week 6 as the least busy week and Monday as the least busy day, but one or both of the explanations to support the answers are vague, unclear, or incomplete.
- Gives an incorrect answer when identifying either the least busy week or least busy day, but the supporting explanations are complete and show some reasoning.

A **2-point** response meets some of the criteria, but may do one of the following or similar:
- Correctly identifies Week 6 as the least busy week and Monday as the least busy day, but fails to provide any supporting explanations.
- Gives a correct answer when identifying either the least busy week OR the least busy day and provides a supporting explanation. The response to the other question is incorrect or missing.

A **1-point** response includes one of the following or similar:
- Correctly identifies Week 6 as the least busy week OR correctly identifies Monday as the least busy day. The other responses are incorrect or missing.
- Shows limited understanding of patterns. May attempt to answer one or two parts of the problem, but the answers are unclear or only partially correct.

A **0-point** response shows little or no understanding of the problem.

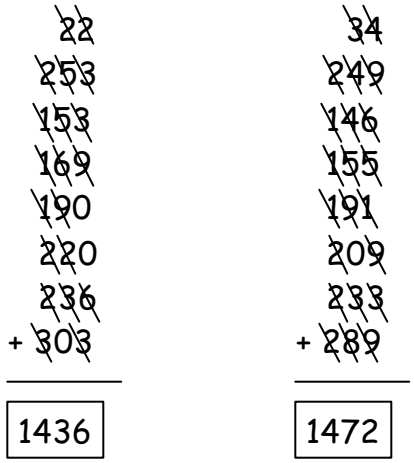
Student Response (4 points)

Week 6	**A**
Because each week less people come.	**B**
Monday	**C**
Because every week Monday's attendance is fewest	**D**

Score 4

This is a 4-point response because the student (**A)** correctly identifies Week 6 as the least busy week, (**B**) provides clear, complete explanations and shows evidence of using the patterns in the table, (**C**) correctly identifies Monday as the least busy day and, (**D**) provides clear, complete explanations and shows evidence of using the patterns in the table.

Student Response (3 points)

Week 4	**A**
I added them all up and week 4 had the lowest number.	**B**
	
Monday	**C**
I went down each row and the lowest numbers were always on Monday.	**D**

Score 3

This is a 3-point response because the student (**A)** incorrectly identifies Week 4 as the least busy week, (**B**) the supporting explanation is complete and shows some reasoning, (**C**) correctly identifies Monday as the least busy day and, (**D**) provides clear, complete explanations and shows evidence of using the patterns in the table.

Student Response (2 points)

Saturday	**A**
Because it has the highest number of the week.	**B**
Monday	**C**
Because it has the smallest number of the week.	**D**

Score 2

This is a 2-point response because the student (**A)** incorrectly identifies Saturday as the least busy week, (**B**) the supporting explanation is incomplete and unclear, (**C**) correctly identifies Monday as the least busy day and, (**D**) provides clear, complete explanations and shows evidence of using the patterns in the table.

Student Response (1 point)

I think that the 6 week will be the least busy.	**A**
Because no one will go because they have other weeks to go.	**B**
Saturday	**C**
Because that is the last day and everyone likes to go on the first day.	**D**

Score 1

This is a 1-point response because the student (**A)** correctly identifies Week 6 as the least busy week, (**B**) the supporting explanation is incomplete and unclear, (**C**) incorrectly identifies Saturday as the least busy day and, (**D**) the supporting explanation shows no evidence of using the patterns in the table.

Student Response (0 points)

Week 4	**A**
Because it has 197, 90, 104, 164, 177, 187, 249 and at the bottom is 249.	**B**
Saturday	**C**
Because it has 303, 289, 264, 249 and the end is 249.	**D**

Score 0

This is a 0-point response because the student shows little or no understanding of the problem. The student (**A)** incorrectly identifies the least busy week, (**B**) the supporting explanation is incomplete and unclear, (**C**) incorrectly identifies the least busy day and, (**D**) the supporting explanation is incomplete and unclear.

#31
STUDENT RESPONSES AND SCORING

A **4-point** response includes all of the following components:
- Correctly determines the value of the cards owned ($7.59) will allow the purchase of the 2 cards.
- Correctly calculates the total value of the cards wanted to purchase is $5.25.
- Clearly states that, yes, the friends would have enough money to buy the 2 cards.
- Clearly provides all supporting work and explanation.

A **3-point** response includes the following or similar:
- Applies a valid strategy to solve the problem, but makes 1 or 2 minor calculation errors which result in an incorrect final answer.
- Indicates whether or not the friends would have enough money to buy the cards. The response is consistent with the student's calculations.
- Provides sufficient supporting work and explanation.

A **2-point** response includes the following or similar:
- Attempts to apply a valid strategy to solve the problem, but makes significant errors.
- Indicates whether or not the friends would have enough money to buy the cards. The response may or may not be consistent with the student's calculations.
- Provides some supporting work and explanation.

A **1-point** response includes the following or similar:
- Demonstrates limited understanding of the problem.
- Attempts to apply a strategy to solve the problem, but the strategy is incomplete, unclear, or contains major flaws.

A **0-point** response shows little or no understanding of the problem.

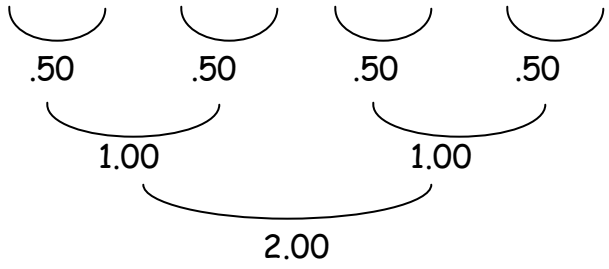
Student Response (4 points)

25+25+25+25+25+25+25+25=2.00 28+28+28+28+28+28+28+28+28+28=2.80 30+30+30+30+30+30=1.80 2.00+2.80+1.80+0.99=$7.59	**A**
1.50+3.75=$5.25	**B**
Yes, they would have enough money for both the cards.	**C**
I added all the money they had and then I added how much money both the cards are. The money they have altogether is more than the cost of the other two cards.	**D**

Score 4

This is a 4-point response because the student (**A**) correctly calculates the total value of the cards owned is $7.59, (**B**) correctly calculates the total value of the card wanted to purchase is $5.25, (**C**) clearly states that, yes, the friends would have enough money to buy the 2 cards, and (**D**) clearly provides all supporting work and explanation.

Student Response (3 points)

I added all of the .25's, .28's, .30's, and one .99. .90 + 2.00 = 2.90 + 1.80 = 4.70 + 2.80 = 7.50 Yes, they would have enough money for both cards. .25 + .25 + .25 + .25 +. 25 + .25 + .25 + .25  .25+.25+.25+.25+.25+.25+.25+.25+.25+.25=2.50 .03+.03+.03+.03+.03+.03+.03+.03+.03+.03=0.30 2.50+.30=2.80 .30+.30+.30+.30+.30+.30=1.80	**A** **B** **C**

Score 3

This is a 3-point response because the student (**A)** attempts to solve the problem, but makes 1 or 2 minor calculation errors which result in an incorrect final answer, (**B)** indicates whether or not the friends would have enough money to buy the cards which is consistent with the student's calculations, and (**C**) provides sufficient supporting work and explanation.

Student Response (2 points)

220 + 99 + 180 + 200 6.90 10 + 80 90	**A**
They can get 1 of the cards worth $1.52 and the card that is worth $3.75.	**B**
220 + 99 + 180 + 200 6.90 10 + 80 90	**C**

Score 2

This is a 2-point response because the student (**A)** attempts to solve the problem, but makes significant errors, (**B)** indicates whether or not the friends would have enough money to buy the cards which may or may not be consistent with the student's calculations and, (**C**) provides some supporting work and explanation.

Student Response (1 point)

They would not be able to buy the cards they want to because they don't have enough money to buy them with. 2 25¢ + 28¢ + 30¢ + 99¢ 1.82	**A**

Score 1

This is a 1-point response because the student (**A)** attempts to apply a strategy to solve the problem, but the strategy is incomplete, unclear, or contains major flaws.

Student Response (0 points)

They could trade all the cards they have for the ones they want.	

Score 0

This is a 0-point response because the student shows little or no understanding of the problem.

#32
STUDENT RESPONSES AND SCORING

A **4-point** response includes all of the following components:
- Correctly draws and labels a rectangle.
- Correctly draws and labels a triangle.
- Describes at least one correct way in which the rectangle and triangle the student has drawn are similar. For example:
  - Both have straight lines for sides.
  - Both are polygons.
  - Both have corners.
  - Both are 2 dimensional.
  - Both have all sides equal (if the rectangle drawn is a square and the triangle drawn is equilateral).
  - Both have a right angle (if the triangle drawn is a right triangle).
- Describes at least one correct way in which the rectangle and triangle the student has drawn are different. For example:
  - They have different numbers of sides.
  - The rectangle has parallel lines, but the triangle does not.
  - The rectangle has all right angles, but the triangle does not.
  - The rectangle has congruent angles, but the triangle does not have congruent angles (if the triangle drawn is not equilateral).

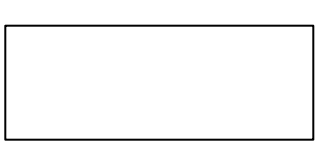
A **3-point** response meets most of the criteria, but may do <u>one</u> of the following or similar:
- Gives exactly three correct responses. The other answer is incorrect or missing.
- Shows understanding of geometric shapes and their attributes. May attempt to answer all parts of the problem, but one or two of the answers are unclear or only partially correct.

A **2-point** response meets some of the criteria, but may do <u>one</u> of the following or similar:
- Gives exactly two correct responses. The other two answers are incorrect or missing.
- Shows some understanding of geometric shapes and their attributes. May attempt to answer three or four parts of the problem, but two or three of the answers are unclear or only partially correct.

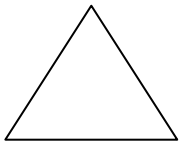
A **1-point** response includes <u>one</u> of the following or similar:
- Gives exactly one correct response. The other answers are incorrect or missing.
- Shows limited understanding of geometric shapes and their attributes. May attempt to answer two or three parts of the problem, but the answers are unclear or only partially correct.

A **0-point** response shows little or no understanding of the problem.

Student Response (4 points)



rectangle



triangle

They are both shapes that have corners. They both have more than 2 sides.

The rectangle and triangle are different because the rectangle has four sides and corners, but the triangle has only three sides and corners.

A & B

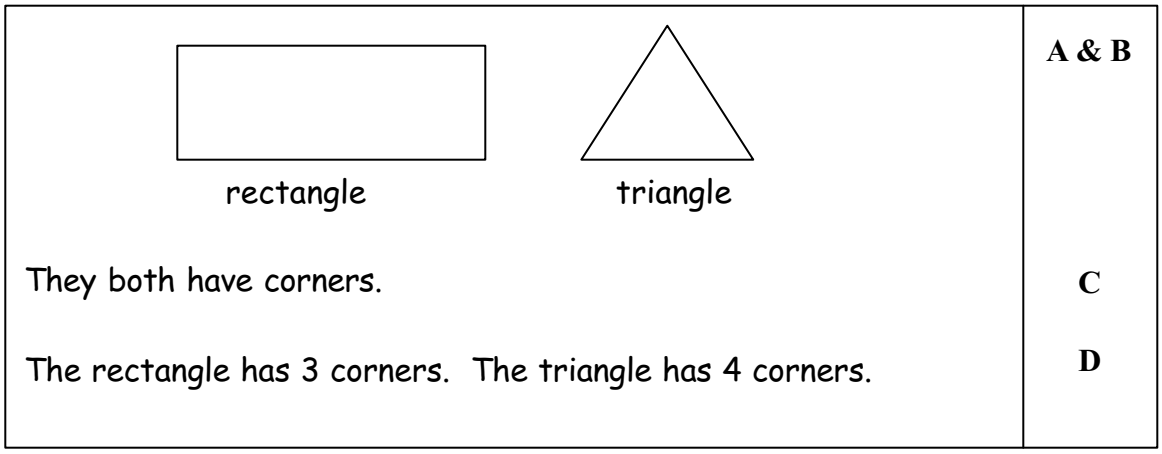
C

D

Score 4

This is a 4-point response because the student (**A)** correctly draws and labels a rectangle, (**B)** correctly draws and labels a triangle, (**C**) describes at least one correct way in which the rectangle and triangle drawn are similar, and (**D**) describes at least one correct way in which the rectangle and triangle drawn are different.

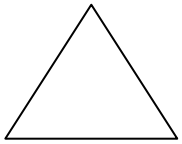
Student Response (3 points)



Score 3

This is a 3-point response because the student gives exactly three correct answers, (**A)** correctly draws and labels a rectangle, (**B)** correctly draws and labels a triangle, (**C**) describes at least one correct way in which the rectangle and triangle drawn are similar, and (**D**) gives an incorrect response on how they are different.

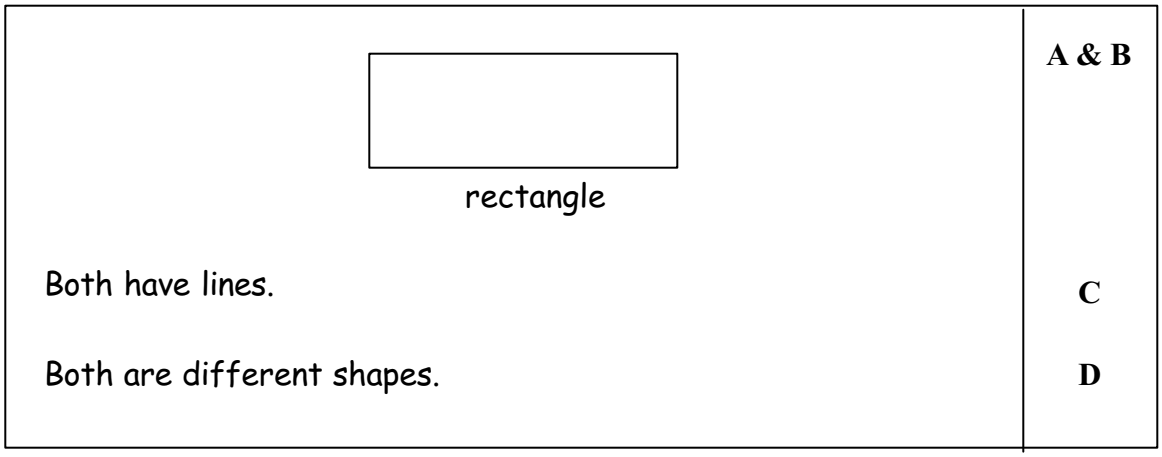
Student Response (2 points)

 rectangle  triangle	**A & B**
Both have sides that are same length.	**C**
The triangle has different shapes, different names, both are different.	**D**

Score 2

This is a 2-point response because the student gives exactly two correct answers, (**A)** correctly draws and labels a rectangle, (**B)** correctly draws and labels a triangle, (**C**) gives an incorrect response on how they are similar, and (**D**) gives an incorrect response on how they are different.

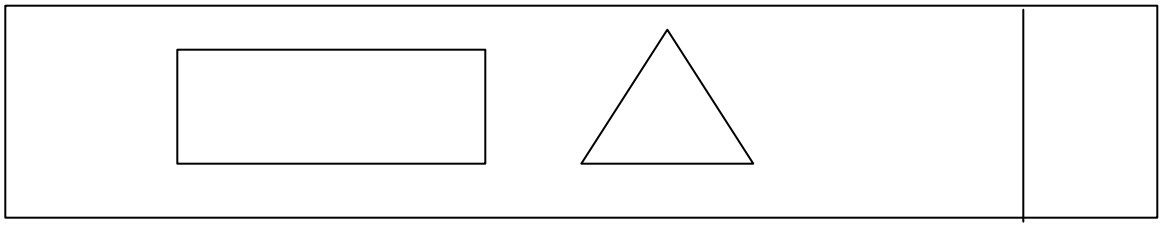
Student Response (1 point)



Score 1

This is a 1-point response because the student gives only one correct answer, (**A)** correctly draws and labels a rectangle, (**B)** does not draw and label a triangle, (**C**) gives an incorrect response on how they are similar, and (**D**) gives an incorrect response on how they are different.

Student Response (0 points)



Score 0

This is a 0-point response because the student shows little or no understanding of the problem.

ANSWER GRID

Item	Benchmark	Answer
1	1.1.5	D
2	1.1.1	B
3	2.1.6	A
4	4.1.1	B
5	5.1.4	A
6	6.1.1	D
7	3.1.2	A
8	2.3.2	C
9	3.2.2	B
10	4.1.1	C
11	1.1.1	OE
12	5.1.2	B
13	1.2.*	D
14	3.2.1	C
15	2.1.1	D
16	4.1.4	C
17	6.1.2	A
18	1.2.2	C
19	3.1.4	B
20	4.2.4	B
21	4.3.3	A
22	3.3.4	OE
23	5.1.4	B
24	2.2.2	A
25	2.3.4	D
26	4.3.3	A
27	5.2.4	C
28	5.2.2	D
29	4.1.4	D
30	3.1.4	C
31	5.1.2	OE
32	2.1.2	OE

* This item assesses both the strand and the standard, but does not match on specific benchmark.

PART FOUR: RESOURCES AND ACKNOWLEDGMENTS

GLOSSARY

Analytic Scoring: The awarding of separate scores for different traits or dimensions of a student's work.

Assessment: The gathering of evidence to judge a student's demonstration of learning. Aids educational decision making by securing valid and reliable information to indicate whether students have learned what is expected.

Benchmark: A statement of what students are expected to learn at various developmental levels (i.e., elementary school, middle school, and high school) to indicate progress made toward meeting a content standard.

Content Standard: A statement indicating what students are expected to know and be able to do by the time they graduate.

Context: General topics expected to be included in the content of a K–12 curriculum that serve as a basis for test items. Context can make the value of mathematics evident.

Curriculum: A coherent plan for a designated period of time specifying the content that students are expected to understand and apply. Normally includes standards, benchmarks, and a sequence of content that serve as the basis for instruction and assessment.

Holistic Scoring: Scoring based on an overall impression of a work rather than on an accumulation of points.

Instruction: The decisions and actions of teachers before, during, and after teaching to increase the opportunities for student learning.

Performance Standards: A description of performance levels based on mathematics content standards and benchmarks. Performance standards serve as a bridge between what is taught and what is tested.

Prompt: Information presented in a test item that activates prior knowledge and requires analysis in order for a student to respond.

Scoring Rubric: A scoring rubric is a tool for evaluating student performance on an assessment task. Includes a set of criteria used to determine the level of a student's performance.

Subject Area: A body of content derived from related disciplines and organized for curriculum.

Strand: A category for classifying the content standards of a subject area curriculum. The mathematics content standards are categorized into six strands: patterns, relationships and functions, geometry and measurement, data analysis and statistics, number sense and numeration, numerical and algebraic operations and analytical thinking, probability and discrete mathematics.

MATHEMATICS EDUCATIONAL RESOURCES

Following are web addresses that contain mathematics educational resources consistent with the Michigan Curriculum Framework.

The Michigan Department of Education at <www.mde.state.mi.us> The state curriculum framework and resources associated with the framework.

The Michigan Department of Treasury – Merit Board at <www.meritaward.state.mi.us> The site for MEAP including state assessment data.

The Michigan Council of Teachers of Mathematics (MCTM) at <mictm.org> The state's professional organization for mathematics education.

The National Council of Teachers of Mathematics (NCTM) at <nctm.org> The nation's professional organization for mathematics education. This site also contains an electronic version of the national mathematics standards.

Macomb Intermediate School District at < http://www.macomb.k12.mi.us/> A leading intermediate school district in the development of mathematics education materials.

The Eisenhower National Clearinghouse for Mathematics, Science, and Technology (ENC) at <enc.org> Our national mathematics education clearinghouse.

The North Central Regional Educational Laboratory (NCREL) houses the ***Midwest Mathematics and Science Consortia*** (a USDOE funded program) at <www.ncrel.org/msc/msc.htm> Our regional resource for mathematics, science, and technology education.

The Third International Mathematics and Science Study (TIMSS) at <http://timss.bc.edu> The latest, and most comprehensive, study in the status of international mathematics education.

The National Assessment of Educational Progress (NAEP) at < http://nces.ed.gov/nationsreportcard/site/home.asp> The national assessment and the nations' report card for mathematics education.

The NSF-funded comprehensive instructional materials projects' Implementation Centers:

Elementary Instructional Materials: The ARC Center at <www.comap.com/arc>

Middle School Instructional Materials: The Show-Me Center at <showmecenter.missouri.edu>

Elementary School Instructional Materials: COMPASS at <www.ithaca.edu/compass>

MICHIGAN DEPARTMENT OF EDUCATION
MICHIGAN EDUCATIONAL ASSESSMENT PROGRAM

MATHEMATICS ASSESSMENT PLANNING COMMITTEE

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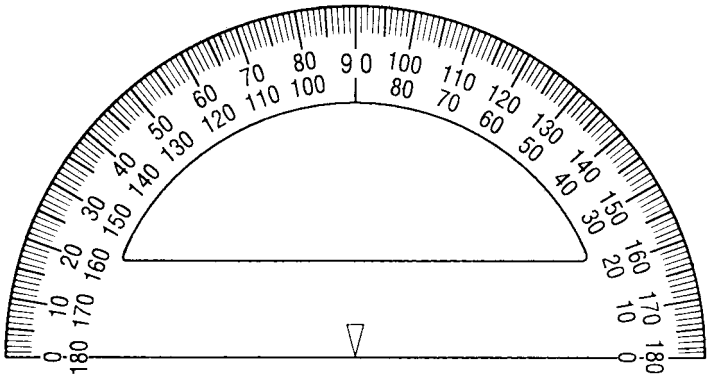

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